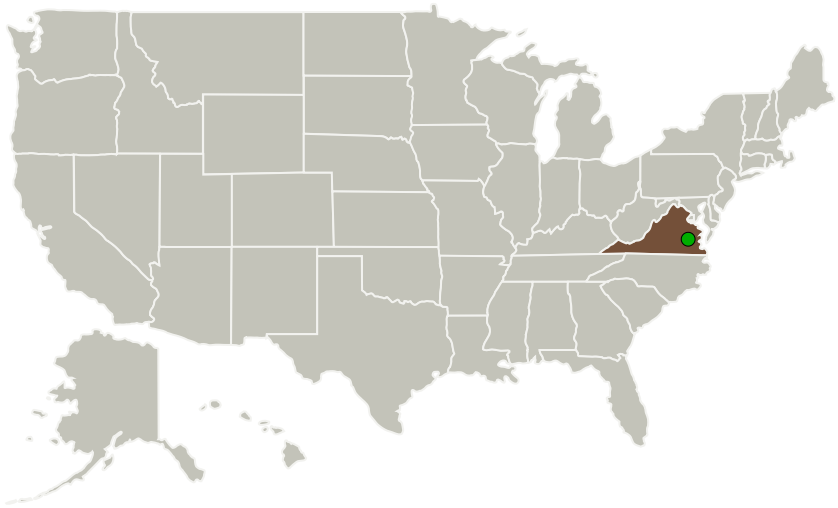
Damage Adaptive Guidance for Piloted Upset Recovery, Phase II

Completed Technology Project (2015 - 2017)

Project Introduction

Aircraft Loss-Of-Control (LOC) has been a longstanding contributor to fatal aviation accidents. Inappropriate pilot action for healthy aircraft, control failures, and vehicle impairment are frequent contributors to LOC accidents. These accidents could be reduced if an on-board system was available to immediately guide the pilot to a safe flight condition (including cases of control failure or vehicle impairment). Barron Associates previously developed and demonstrated (in pilot-in-the-loop simulations) a system for finding appropriate control input sequences for upset recovery, and for cueing pilots to follow these sequences. The proposed work adds several innovative capabilities to the existing architecture and includes flight test verification of the efficacy. One of the most significant current enhancements is the addition of adaptation to address off-nominal vehicle responses. Off-nominal vehicle responses can occur for a number of reasons including adverse onboard conditions (e.g., actuator failures, engine failures, or airframe damage) and external hazards, especially icing. The addition of adaptation capabilities enables the system to provide appropriate upset recovery guidance in cases of off-nominal vehicle response. The recovery guidance system is also specifically designed to be robust to variations in pilot dynamic behavior as well as to provide robustness to pilot deviations from the recommended recovery strategies.

Primary U.S. Work Locations and Key Partners



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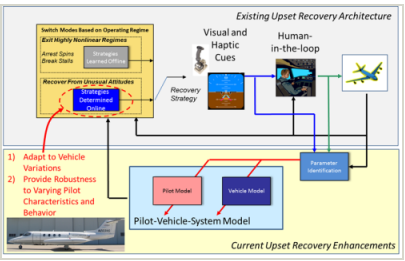
Organizations Performing Work	Role	Type	Location
Barron Associates, Inc.	Lead Organization	Industry	Charlottesville, Virginia
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations
Virginia

Images



Briefing Chart
Damage Adaptive Guidance for Piloted Upset Recovery Briefing Chart
(https://techport.nasa.gov/image/127191)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Barron Associates, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Richard Adams

Co-Investigator:
Nathan D Richards

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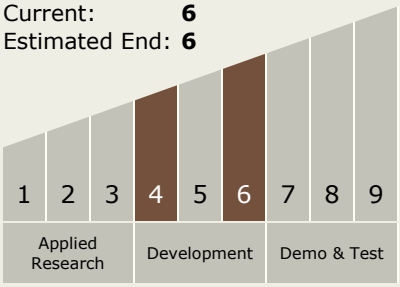
Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.3 Mission Operations and Safety
    - TX07.3.2 Integrated Flight Operations Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System